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ENGINEER'S REPORT OF PROPOSED IMPROVEMENT FOR ZONE NC-1 OF THE SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
(PROJECTS NOS. 1, 2, 3, 4, 5, 6 and 7)

INTRODUCTION

The problems that accompany extreme rapid growth are with us. The evidence of flood damage and storm drainage problems are familiar to all. Existing conditions may be corrected by the voters approval of a bond issue to defray the cost of improvements proposed in this report.

The disastrous floods of 1955, 1952, 1911, 1893 and 1862 were glaring examples of the extreme inadequacy of existing natural and man-made flood control and drainage facilities.

A series of dry winters, which, unfortunately, usually coincide with a period of rapid population increase and development, tend to cause forgetfulness of the purpose of a watercourse. In some cases, they were ignored; in others, an undersized channel became the expedient. While it is possible that people seeking development sites may be deceived by innocent appearing dry channels, it is a well known and tragic fact that flooding water rapidly exposes the deception and leaves, in its aftermath, much destruction, loss of property and discomfort.

Floods usually leave the natural channel seeking a more direct route toward sea level and, receding, they present the familiar picture of damage to homes, industrial property, roads and agricultural land, deposits of mud and debris, possible loss of life, epidemics and chaos.

However, in the case of Zone NC-1, even a more direct route of flood waters to sea level is woefully lacking. Due to a series of factors that include tidal silt, subsidence and other factors described in the following brief history, flood waters spread over wide areas, sometimes remain ponded for weeks before they are dissipated.

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Early in the twentieth century, certain industrial and agricultural interests built a series of levees on the south Bay frontage from Mayfield Slough, north of Palo Alto, to Steamboat Slough at Alviso.

In building the levees, much land was reclaimed for use because it was no longer subject to inundation by the daily tidal action of San Francisco Bay. Unfortunately, however, in the process of constructing the levees, five major outlets for winter run-off were dammed off, necessitating diversion of the waters from seven creeks and one river, the Guadalupe.

Among the major outlets divorced from their original function of carrying off flood waters is Guadalupe Slough, which is proposed in this report to be reopened.

NATURE AND SCOPE OF REPORT

Zone NC-1 of the Santa Clara County Flood Control and Water Conservation District contains approximately 80 square miles in Santa Clara County and embraces the watersheds of the Calabazas, Saratoga and San Tomas Aquino Creeks and their respective tributaries, and an area in the Sunnyvale-Moffett field region not now served by any defined stream or channel.

The following report, in general, explains the proposed improvement consisting of related projects within Zone NC-1 consisting of work on the above creeks, installation of outfall channels in undrained areas, and construction of outfalls into San Francisco Bay. This report explains the proposed work as a single improvement. Each portion of the improvement is given individual attention in later portions of this report, and, for reference purposes only, each portion of the improvement has been assigned a project number. The scope of this report is preliminary in nature, and deals principally with the main phases of engineering and planning. It shows:

1. A general description of the work proposed to be done, together with general plans, profiles, cross sections, and general specifications relating thereto, on each project constituting the improvement.
2. A general description of the land, rights of way, easements, and property proposed to be taken, acquired or injured in carrying out said work.
3. Maps which show the location of each of said projects constituting the improvement, and land, rights of way, easements and property to be taken, acquired or injured in carrying out said work, and any information in regard to the same that is deemed necessary or useful.
4. An estimate of the cost of the improvement in Zone NC-1 and each of the projects constituting the improvement, which includes an estimate of the cost of land, rights of way, easements and property proposed to be taken, acquired or injured in carrying out said improvement, and also of all incidental expenses likely to be incurred in connection therewith, including legal, clerical, engineering, superintendence, inspection, printing and advertising, and the total amount of bonds necessary to be issued to pay for the same.

In addition, the report contains general information as to past flooding, benefits to be expected from the improvement and methods of financing.

The accompanying general plans and specifications have been prepared to establish the economic feasibility of the proposed improvement. General construction plans for some of the projects within Zone NC-1 have been designed and prepared by various civil engineers engaged by the District. The engineering staff of the District prepared the plans for Calabazas Creek from El Camino to San Francisco Bay, designated as Project No. 1.

Following are listed the private engineering firms together with the respective projects for which they made preliminary surveys, designed and prepared plans in cooperation with the District staff:

Mark Thomas & Co.	Project No. 2	San Tomas Aquino Creek from Wildcat Creek to San Francisco Bay
Mission Engineers	Project No. 3	Saratoga Creek from Stevens Creek Road to its confluence with San Tomas Aquino Creek
George S. Nolte	Project No. 4	Calabazas Creek from one-half mile south of Stevens Creek Road to El Camino Real
Calvin M. Jones	Project No. 5	Regnart Creek from the Vasona branch of the Southern Pacific Railroad to its confluence with Calabazas Creek
Mackay & Somps	Project Nos 6 & 7	East Sunnyvale Outfall from Fremont Avenue to Agnew Canal, and West Sunnyvale Outfall from Maude Avenue to Moffett Field Canal.

TOPOGRAPHY WITHIN THE ZONE

Zone NC-1 contains approximately 80 square miles. The mountainous area within the North Central Zone encompasses an area of approximately 19 square miles. The steep mountain slopes in general include the area between the "Skyline" ridge (highest point of elevation 3214 feet) and the base of the hills. The 61 square miles of valley include the alluvial plain that slopes in a more or less northeasterly direction from elevations approximating 400 feet at the base of the hills to minus 3 feet immediately south of the salt evaporating ponds.

Included in the zone, in addition to concentrated urban areas, are scattered and sprawling residential districts in both unincorporated and incorporated areas.

In addition to the unincorporated town of Saratoga, incorporated cities lying wholly or in part within the zone are Sunnyvale, Santa Clara, Cupertino, San Jose, Campbell, Los Gatos and Alviso.

At present a majority of the valley floor is still agrarian, but existing trends of city growth indicate complete ultimate residential (and/or commercial and industrial) development of the entire valley portion within the zone boundaries. Agricultural usage includes orchards, vineyards, row crops and pasture. Most of the agrarian land is in a four-mile-wide band adjacent to the foothills. The valley floor, particularly that portion adjacent to San Francisco Bay, is subject to constant subsidence of various degrees.

PAST FLOODS

Adequate flood control is a critical necessity to the development, prosperity and economy of Zone NC-1. An intolerable situation exists when residential, commercial, industrial and institutional areas, orchards, pastures, highways, railroads and other public and private properties are subjected to and damaged by floods as most recently evidenced during the January, 1952 and December, 1955 storms.

During these floods, most of the natural streams within Zone NC-1 overflowed their banks in various places, particularly in Campbell, Sunnyvale, suburban portions of San Jose, Santa Clara, Saratoga and agricultural areas from the foothills to the Bay. Creek overflow during the 1955 flood inundated large areas and caused widespread damage in Zone NC-1.

The rainfall years* of more severe floods have been 1951-1952, 1940-41, 1918-1919, 1910-1911, 1892-1893, and 1861-1862. The areas adjacent to San Francisco Bay from Moffett Field to Alviso were flooded from 4 feet to 7 feet deep in many of the years mentioned above. Other regions in the Zone as far south as Saratoga have experienced damaging inundations many times.

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*Yearly rainfall in this area is computed for the fiscal year beginning on July 1st.

During a storm occurring in September, 1918, between 25% and 50% of prune crops were destroyed by floods and heavy damage occurred to tomatoes, peaches, hay and grain. It was estimated that damage to crops ran into several millions, but the exact amount cannot be found in the records.

During the 1951-1952 storm, floods covered large portions of the zone. Damage to private property in the County was estimated at over $500,000 and the loss of one life. Damage to creeks was not estimated, but immediate and accumulated damage to roads and bridges approached $700,000.

In 1955-1956 the damages within the County approximated $8,500,000 including creek damages at $2,400,000. Immediate damage to County roads and bridges was estimated to be $541,000 with accruing damage probably approaching $2,500,000. Heavy rainfall was for the most part limited to the "west hills" (Santa Cruz Mountains), which comprise the headwaters of streams in Zone NC-1.

Preliminary estimates indicate that damages to Public property within cities may exceed $1,500,000; to Public Utilities $100,000; to residential and industrial property $2,000,000.

Figures on agricultural losses will not be available until damage surveys are completed and until the effect of the flood is projected to crop reduction at harvest time. However, unofficial estimates indicate losses totaling several million dollars.

Evacuations from homes in portions of Saratoga, Campbell, Santa Clara and Sunnyvale were ordered during the 1955 flood to prevent loss of life, adjacent to the banks and in the flood plains of the three major creeks of the zone.

According to available records in the office of the Santa Clara County Engineer, the areas historically subject to flooding in the North Central Zone of Santa Clara County are as follows:

1. A strip along both banks of San Tomas Aquino Creek varying in width from one-quarter to one mile, and running from Bicknell Road to Williams Road, and from Stevens Creek Road to Alviso.
2. Narrow strips along the banks of Saratoga Creek have been damaged by erosion and/or inundation at various places from the town of Saratoga to Homestead Road. At Homestead the stream traditionally breaks over and joins flood waters from San Tomas Aquino Creek to widen the inundated area on northerly to Alviso.
3. Although Calabazas Creek has an adequate channel from the foothills to Stevens Creek Road, the tributary areas are subject to periodical sheet flooding over large areas in the upper valley basin because alluvial deposits constantly shift the lesser streams and cut off their outfalls into Calabazas. From Homestead Road northerly, this creek also breaks over its banks and joins waters of Saratoga Creek to make a more than mile-wide solid sheet with depths of from one to five feet to San Francisco Bay. This latter area experienced the most serious flooding and majority of the damage in Zone NC-1 during the December, 1955 flood.
4. Many other low-lying areas in Zone NC-1, too widespread to describe in detail, on the valley floor are subject to inundation from local runoff that has difficulty in finding its way to a defined channel. This is particularly true of the Fremont-Sunnyvale-Moffett Field area, and a half-mile wide strip bordering the salt evaporating ponds on the edge of San Francisco Bay.

From all the testimony given it is quite evident that, in the future, overflows as well as local inundation, will occur again if channel capacity is not provided for flood peak runoff. Subsequent overflows, however, will be much more serious because of the steady trend toward more densely populated and built-up areas.

BASIC CONSIDERATIONS

The rate of growth of the Santa Clara Valley at the present time is between 3500 and 4000 persons per month. People are, for the most part, being attracted to this area by the employment possibilities in new industries and commercial enterprises. The new residential areas resulting from this growth are served by storm drainage systems having their main outfalls into existing stream channels.

Water which used to pond on orchard land or be retarded by vegetal growth is, to an increasing degree, being intercepted by gutters and drainage collection systems and carried rapidly off to the streams. A greater percentage of rainfall is being drained off laterally from the surface of the land rather than being allowed to percolate into the soil. Severe storm runoffs which occurred only infrequently when the land use was primarily agricultural will occur with greater frequency as the imperviousness of the area increases and the flow velocity is increased by drainage collection systems.

Channel improvements are planned with the following factors in mind:

1. Provide a waterway of adequate capacity to carry the runoff from fully-developed land on the Valley floor receiving precipitation from a storm estimated to occur on an average of every 50 years; and to provide where possible an additional safety factor (freeboard) which will increase capacity to that of a 100 year frequency storm.

2. Final alignment and capacity to fit the future development pattern of the area, and also to cause a minimum of property severance along the route of the stream.
3. Provide a means of ready access to the channel so that emergency and maintenance crews can take care of any exigency.
4. Design improvements within the economic limits reached when initial construction costs are balanced against future anticipated maintenance expense.
5. Provide channels of sufficient depth to accomodate future storm drains from remote areas of the basin.

GENERAL SPECIFICATIONS

On all of the projects in the proposed improvement, general specifications for all types of excavation, levees, channel lining, structures, appurtenances, and miscellaneous construction shall be according to standards of the County of Santa Clara and applicable provisions of construction details, Section 10 to Section 60, inclusive, of the specifications entitled "State of California, Department of Public Works, Division of Highways, Standard Specifications, August 1954", insofar as they apply. Said specifications are herein referred to as the Standard Specifications and are hereby made a part of these specifications. In the event of conflict between the Standard Specifications and the special provisions of these specifications, the latter shall apply.

Channel excavation and levee construction shall be made as shown on the plans, or as directed by the engineer, true to line, grade and cross-section. Whenever possible, excavated material shall be used for levee construction. When excavating within a roadway, one traffic lane each way shall be kept open and in safe condition at all times, unless written permission to close the road is obtained.

Bridges, culverts, wingwalls, check dams and channel lining shall be constructed of reinforced concrete or other structurally adequate material as shown on the plans, and the work shall conform to appropriate provisions of the Standard Specifications.

Service road bridges shall be constructed in locations to be determined by the engineer. The work shall conform to the provisions of the Standard Specifications.

Details of, and specifications for, all appurtenant pipes, tide gates, utility changes and/or protection, as well as all other details required to make a complete project shall be described in specifications to be prepared in conjunction with contract bid plans.

Profiles and typical cross-sections are as shown on the accompanying plans.

GENERAL DESCRIPTION OF LAND, RIGHTS OF WAY AND EASEMENTS

Land, rights of way and easements will be required to provide for construction and maintenance of channels, levees, closed conduits, access and maintenance facilities, and the retarding basins. All real estate thus to be aquired is graphically described on the accompanying general construction plans.

RELOCATION OF STRUCTURES AND UTILITIES

Certain utilities such as sanitary sewers, storm sewers, gas mains, water mains, telephone cables, electric power and telephone lines, etc., will have to be raised, lowered or relocated where such utilities conflict with the proposed improvements.

GENERAL MAINTENANCE

Various types of maintenance and erosion control will be required from time to time on the rights of way, channels, improvements and basins acquired by the District. Cost of such maintenance or erosion control is not included in the aforementioned estimated costs or the amount required for a bond election. Financing for maintenance and erosion control will be derived by an annual tax or assessment levied pursuant to Section 13 of the Santa Clara County Flood Control and Water Conservation District Act.

GENERAL DESCRIPTION OF IMPROVEMENTS

The most feasible solution of the flood control problem will include, in general, the following items of work on each improvement as shown on the accompanying respective plans:

1. Constructing adequate channel sections, where the existing channel is insufficient to carry design flows, by all or part of the following: deepening, realigning, widening and lining with riprap.
2. Improve or replace all existing bridges and culverts which serve as local obstructions to the channel capacity.
3. Clear and remove the accumulation of trees, brush and debris which impede flow in existing channels.
4. Lining portions of the channels with reinforced concrete.
5. Constructing or improving various hydraulic structures to control velocity and reduce erosion.

In the portions of existing creeks that have a channel section adequate to carry design flows, improvements should be limited to clearing the channel of brush and debris. In these areas the retentive value of, and erosion protection provided by the natural state of the creek, should be maintained. However, plan lines should be established as indicated on the drawings to prevent abutting property owners from encroaching upon the natural limits of the stream.

Existing bridges or culverts that should be replaced are indicated on the plans. Where the existing bridge can be modified to increase its capacity, the improvement will consist of the following items of work: Construction of a reinforced concrete floor, protective cutoff walls and transition sections at both ends of the bridge.

It is expected that certain reasonable modification may have to be made in the improvement plans to suit changed conditions that may exist at the time of construction.

In addition to the construction indicated on the plans, the following items may be included, if determined to be a necessary adjunct to the project: Automatic drainage gates, appurtenances, access rights of way for maintenance and other items to be determined by the engineer.

The seven projects encompassed in this report require various types and amounts of construction in order to complete improvements as shown and proposed in the accompanying plans, to wit:

Project No. 1. Amended Report on Calabazas Creek from El Camino Real to Guadalupe Slough

This project deals with improvement and realignment of the Calabazas Creek within the limits shown under general location, and will consist of:

1- A channel with 1 and 1/2 to 1 side slopes and bottom widths varying from 8 feet to 40 feet;

2- Construction of a retarding basin that will serve several purposes, to wit:

   a. Preclude the almost impossible task of providing a ditch-bottom grade over the table-flat terrain immediately south of the salt evaporating ponds;

   b. Minimize levee maintenance that would be required to sustain an operable ditch in a continually subsiding area;

   c. Eliminate future slough maintenance dredging by holding tide water in the basin until low slack tide, then releasing it at high velocity through the slough channel;

   d. Partially absorb peak flows that coincide with high tides;

3- Construct a series of culverts and bridges under intervening railroads, streets and highways; and,

4- Construct a levied channel through the salt evaporating ponds to provide an outlet to Guadalupe Slough.

In addition to the construction as indicated on the plans the following items may be included if it is determined to be a necessary adjunct to the project: Automatic drainage gates and other miscellaneous appurtenances; access rights of way for maintenance; and, other items to be determined by the engineer.

This is an amendment to the original report filed on January 6, 1956, for which a public hearing was held on January 30, 1956, at 11:00 a.m. in the Hearing Room of the Civic Center, North First and Rosa Streets, San Jose, California. At the conclusion of said hearing, the Board approved the engineer's report. The purpose of this amendment is to include said project within the scope of this report and over-all improvement for Zone NC-1 and the hearing to be held thereon, and to revise the method and amount of financing to conform to the provisions contained herein.

Project No. 2. San Tomas Aquino Creek from Vasona Branch of the SPRR to Guadalupe Slough.

This project deals with improvement and realignment of the channel and appurtenant culverts and bridges of said creek, and will consist of:

1- A channel with 1 to 1 and 1 1/2 to 1 side slopes, depending upon soil characteristics, for the earth-lined portions, and 1 to 1 side slopes for the concrete lined portions, with bottom widths ranging from 12 feet to 75 feet.

2. Construction of an easterly extension of the Calabazas retarding basin to accomplish the same purposes defined under parts 2-a through 2-d of said Calabazas project.

Where practicable, the improved channel shall be earth lined, but on sharp turns, channel confluences, deep fill areas and where velocities are very high, the channel shall be concrete lined to prevent scouring.

The existing inadequate drainage structures and other channel crossings shall be improved or replaced with adequate structures to carry the design capacities of the channel, throughout the length of the proposed improvements.

In addition to construction indicated on the plans, the following items may be included if it is determined to be in the interest of the zone: Automatic drainage gates and appurtenances, rip-rap, various bank protection, fences, siphons, access rights-of-way for maintenance; numerous existing storm drain outfalls will need revised construction in order to conform with proposed channel section, alignment and/or grade; and, other items to be determined by the engineer.

Project No. 3. Saratoga Creek from Stevens Creek Road to Confluence with San Tomas Aquino Creek.

This portion of the project deals with improvement of the channel of said creek as shown on the accompanying plans, and consists of:

1- Bank protection along eroding portions of the channel that has an existing adequate section where realignment is not feasible:

2- Excavation of inadequate and/or poorly aligned portions of the channel to proposed alignment and cross-section as shown in the plans.

3- Revision of numerous existing storm drain outfalls to conform with proposed channel alignment and/or section;

4- Construction of levees where available depth is not sufficient to bring anticipated high water surface below existing ground; and

5- Improve existing structures to increase efficiency and hydraulic capacity, and reduce danger of log jams at structure intakes both by alteration of structures and construction of a trash rack immediately upstream from Stevens Creek Road.

In addition to construction indicated on the plans, the following items may be included if it is determined to be a necessary adjunct to the improvements proposed herein: automatic drainage gates and appurtenences, fences, siphons, utility by-passes, access rights of way for maintenance, and other items of work to be determined by the engineer.

Project No. 4. Calabazas Creek from One-Half Mile South of Stevens Creek Road to El Camino Real.

The fourth portion of this project proposes the improvement of the Calabazas Creek channel within the limits described and other construction more specifically consisting of:

1- Bank protection and grade-reducing drop structures along adequate portions of the existing channel where excess flow velocities cause harmful erosion;

2- Excavation of inadequate and/or poorly aligned portions of the channel to proposed alignment and cross-section as shown on the plans;

3- Revision of existing storm drain outfalls to conform to proposed channel alignment and/or section;

4- Construction of levees where available depth is not sufficient to bring anticipated high water surface below existing ground; and

5- Improve or replace structures to increase their hydraulic capacity and efficiency, and reduce danger of log jams by alteration of structure intakes and construction of a trash rack at Stevens Creek Road; and

6- At El Camino Real conform to improvements proposed under description of Project No. 1 in order to accomplish a continuous and coordinated flood control project.

In addition to construction indicated on the plans, the following items may be included if it is determined to be a necessary adjunct to the improvements proposed herein: automatic drainage gates and appurtenances, fences, siphons, utility by-passes, access rights of way for maintenance, and other items of work to be determined by the engineer.

Project No. 5. Regnart Creek from the Vasona Branch of the Southern Pacific Railroad to Its Confluence With Calabazas Creek.

The fifth project covered in this report proposes the improvement of the Regnart Creek channel within the limits described above, and as shown on the accompanying plans, to wit:

1- Excavation of inadequate and/or poorly designed portions of the channel to proposed alignment and cross-section as shown on the plans;

2- Replace all existing structures with adequate, properly aligned structures, and protect against debris clogging with a trash rack near the Stelling Road structure;

3- Facilitate the outfall into Regnart Creek of two subsidiary tributaries by installation of short reaches of reinforced concrete pipe; and

4- Protect the channel against erosion by installation of lining and/or drop structures at strategic positions.

In addition to construction indicated on the plans, the following items may be included if it is determined to be a necessary adjunct to the improvements proposed herein: automatic drainage gates and appurtenences, fences, siphons, utility by-passes, access rights of way for maintenance, and other items of work to be determined by the engineer.

Project No. 6. East Sunnyvale Outfall from Fremont Avenue
to Agnew Canal.

The City of Sunnyvale lies on an alluvial ridge, and as a result has no nearby streams to act as outfalls for storm drains. This portion of the report covers the proposed construction of a new channel within the limits described above, and as shown on the accompanying plans, to wit:

1. Excavation of an open channel along the line and grade, and with the cross-sections shown on the accompanying plans;
2- Building up existing levees on Agnew Canal, and improvement or removal of the tide gate at Moffett Field Channel to provide an outlet to San Francisco Bay. If proper staging can be arranged, the proposed channel will take an alternate course into the retaining basin which is a part of Project No. 1 described hereinabove, and the waters thus discharged will flow into the Bay through Guadalupe Slough, together with structures;

In addition to construction indicated on the plans, the following items may be included if it is determined to be a necessary adjunct to the improvements proposed herein: automatic drainage gates and appurtenences, fences, siphons, utility by-passes, access rights of way for maintenance, and other items of work to be determined by the engineer.

Project No. 7. West Sunnyvale Outfall from Maude Avenue to
Moffett Field Canal.

As outlined under Project No. 6 above, Sunnyvale must be provided with artificial outfall chanels in lieu of natural streams that have been diverted easterly by historical alluvial deposits. This project deals with the construction of such a channel in the northwest environs of the city as shown on the accompanying plans, and consists of:

1- Construction of an open channel, together with necessary structures under existing roads and streets, along the line and grade, and with the cross-section shown on the plans;
2- Raising of existing levees along the southerly side of and adjacent to the salt evaporating ponds;
3- Improvement or removal of the existing tide gate at the southerly end of Moffett Field Channel to facilitate discharge into San Francisco Bay of waters carried by the proposed channel; and,
4- Protection against the erosive action of high velocities by the installation of reinforced concrete lining and/or drop structures at strategic locations.

In addition to construction indicated on the plans, the following items may be included if it is determined to be a necessary adjunct to the improvements proposed herein: automatic drainage gates and appurtenences, fences, siphons, utility by-passes, access rights of way for maintenance, and other items of work to be determined by the engineer.

Since critical grade conditions in the northerly part of the zone require design of leveed channels, it can be seen that water surface elevations at peak flow will be above surrounding lands. It should therefore be noted that, although lands below elevation ten will be protected from stream overflow, they cannot drain by gravity into the adjacent channel. Local drainage of said lowlands is, therefore, not a part of this project and will need to be accomplished by a locally-financed improvement.

PROJECT COOPERATION ON FUTURE DAMS

The Santa Clara Valley Water Conservation District has proposed the construction of a dam on the Calabazas Creek which would serve the purpose, among other things, of holding the diverted waters from the upper Saratoga Creek watershed area. The dam would be primarily for use in water conservation, but would also aid in flood control in view of its ability to hold peak flows of a heavy runoff prevalent in the upper areas of the Calabazas and Saratoga watersheds. It is probable that if the upper Saratoga Creek is diverted into the proposed Calabazas Dam, the decrease in flow of the Saratoga Creek may affect, to some extent, the proposed channel sizes on the Saratoga Creek, the San Tomas Aquino Creek from the confluence of the Saratoga and San Tomas Aquino Creeks to the Bay, and on the Calabazas Creek. However, because of present channel inadequacy and anticipated development with resultant increase in runoff, all of the above creeks will require considerable enlarging, even if a dam is constructed. At this writing, no complete estimates have been made in regard to the effect of the proposed dam on the channel sizes and costs downstream. A further study will be necessary to determine to what extent Zone NC-1 of the Flood Control and Water Conservation District is benefited for flood control purposes and to arrive at a cost comparison of the improvements proposed in this report to the lesser improvements required with the dam constructed.

The maximum financial benefit would be the difference between the estimated improvement costs as set forth herein and the lesser improvement costs which would result from construction of such dam with resultant smaller channels downstream from the dam. Any financial contribution to the Santa Clara Valley Water Conservation District would not exceed this amount, which is included in the total estimated cost set forth herein and the total amount of bonds necessary to be issued to pay for the improvement.

It is hereby proposed that the Santa Clara County Flood Control and Water Conservation District and the Santa Clara Valley Water Conservation District enter into cooperative agreements for the financing and operation of such dam, if constructed, and that the Santa Clara County Flood Control and Water Conservation District participate financially in the cost of constructing such dam in proportion to the benefits received for flood control in an amount not to exceed the maximum financial benefit as described above.

It should be pointed out that there will be no reduced costs for flood control work if the entire saving it costs of channel construction is contributed to the Santa Clara Valley Water Conservation District for flood control benefits accruing from water conservation dams, and that such contribution could occur only if the Santa Clara Valley Water Conservation District obtains approval and financing for such dam.

ESTIMATED COSTS

The estimated cost for the proposed improvement is $5,191,000 and includes construction costs, costs of land, rights-of-way, easements and property proposed to be taken, acquired or injured in carrying out said improvement, costs of necessary new fences and/or moving or replacing existing fences and utilities, all incidental expenses likely to be incurred therewith, including legal, clerical, engineering, superintendence, imspection, printing and advertising, the total amount of bonds necessary to be issued to pay for the same, and any financial contribution which may be made to the Santa Clara Valley Water Conservation District for flood control benefits resulting from construction of water conservation dams.

The costs of the individual projects constituting the improvement are as follows:

Calabazas Creek (Project No. 1)	$ 607,000
San Tomas Aquino Creek (Project No. 2)	$1,950,000
Saratoga Creek (Project No. 3)	$ 260,425
Calabazas Creek (Project No. 4)	$ 345,000

Regnart Creek (Project No. 5)	$ 211,000
East Sunnyvale Outfall (Project No. 6)	$1,283,520
West Sunnyvale Outfall (Project No. 7)	$ 534,055
Total	$5,191,000

As noted hereinabove this report contains an amended proposal for Project No. 1 and said amendment also includes a change in estimated costs. The original report, of date previously noted, contained an estimate in the amount of $515,000. Since filing of said original report, it has been found that market values of certain lands to be acquired for rights of way have experienced a sudden and large increase; in addition, it has been found necessary to compensate for a recent trend in rising construction costs. Due to the reasons just noted the estimate for Project No. 1 is now $607,000. $250,000 has been allocated by the Board of Supervisors, from the fund created by Section 13 of the Santa Clara County Flood Control and Water Conservation District Act, to Zone NC-1 to provide funds for the first stage of construction. $357,000, the difference between the total estimated cost and the amount previously allocated, is therefore the sum included in the total amount of bonds to be issued to pay for the improvement within Zone NC-1.

METHODS OF FINANCING

According to the provisions of the Santa Clara County Flood Control and Water Conservation Act, three (3) primary methods of financing are available.

1) The Board of Supervisors may levy a special ad valorem tax or assessment on property within Zone NC-1 to cover the cost of the project.

Inasmuch as a tax or assessment in Zone NC-1 sufficient to raise the required funds in one year for the entire improvement would place an oppressive burden on the taxpayers of the zone, construction financed by this method would have to be accomplished in stages.

2) The Board of Supervisors may issue general obligation bonds of sufficient amount to cover the costs of this improvement, following approval by the electorate at a bond election. The total amount of bonds to be issued to pay for the improvement is $4,941,000.

Bonds are retired by revenue derived from an annual tax or assessment levied upon all real property, including land and improvements, in Zone NC-1.

3) The Board of Supervisors may levy a District-wide tax or assessment which may be used for the purposes set forth in Section 13 of the Santa Clara County Flood Control and Water Conservation

Act. Pursuant to the terms of Section 13, this fund may be used in any zone provided that taxes or assessments are levied within such zone in the years immediately following the use of said fund to replace the amount so expended.

The assessed valuation of Zone NC-1, according to the latest tabulation of the County Assessor, is $103,118,900.00. In view of the anticipated rapid development, the assessed valuation in Zone NC-1 may continue to increase approximately 10% yearly following channel improvement. During the first year, a revenue of only $103,118 will be realized from a tax or assessment based on a 10¢ rate per $100 of assessed valuation. Therefore, assuming that the tax or assessment levied would not exceed 10¢ per $100 of assessed valuation, it will probably require more than forty years to finance the improvement by stage construction or to replace funds allocated from the fund created by Section 13 above referred to, to pay for the cost of the improvement herein proposed.

It is proposed that a bond election be held for the issuance of bonds in the above amount, and in the event of failure of the electorate to approve a bonded indebtedness, that the Board make use of the provisions outlined under (1) or (3) above. It appears that if bonds are not approved by the electorate of the Zone, the tax rate would have to be increased substantially over 10¢ per $100 of assessed valuation in order to effectively carry out the improvement whether by stage construction or use of the fund created by

Section 13. For purposes of illustration, assuming a constant valuation, the tax rate would be approximately 50¢ per $100 of assessed valuation to perform such work by stages over a 10-year period of time. Using the same assumption, the levy per $100 of assessed valuation for a bonded indebtedness computed on the capital recovery method would be as shown on the table below. If bond funds are available, the work could be performed within 2 to 4 years. Although it appears at first glance that bond interest would bring a greater total cost over the years it should be remembered that the present trend indicates that cost of both land acquisition and construction would rise considerably during a ten-year staging operation; this indicated price rise would necessitate a substantially increased rate during the later stages, and would, in all probability, bring total costs to a figure greater than that of bond principal plus interest. In addition, the flood control problem would not be solved until the final stage was completed ten years hence; in the interim a flood could occur that would cause damage of proportions far greater than the total cost of the improvement proposed in this report.

Average Interest Rate	20-Yr. Bonds	30-Yr. Bonds	40-Yr. Bonds
	Av.Annual Levy	Av.Annual Levy	Av.Annual Levy
3%	32.2¢	24.4¢	20.7¢
3¼%	33¢	25.2¢	21.6¢
3½%	33.7¢	26¢	22.4¢
3 3/4%	34.5¢	26.9¢	23.3¢
4%	35.3¢	27.7¢	24.2¢

BENEFITS TO BE DERIVED FROM PROPOSED IMPROVEMENT

The improvement proposed in this report would be of benefit to Zone NC-1 in the following manner:

1. Public property, including City and County roads, public school property, State highways, Federally-owned property and other publicly owned installations would be free from flood hazards and inundation such as experienced in 1952 and 1955.
2. Privately-owned property would receive the same benefits.
3. Areas subject to inundation would be protected by proper levees and/or adequate channels.
4. Development of presently undeveloped areas would no longer be curtailed. The proposed channels have been designed to carry increased run-off from the areas in which complete urbanization is anticipated in addition to natural run-off during flood periods.
5. Economic benefits will result to the entire zone. Land subject to flooding and inundation is depreciated in value; when this hazard is removed, land values should increase. Land free from flooding or inundation is attractive to industrial, commercial and residential developers. The recent flood of December, 1955 strongly indicates that land free from flooding is also more attractive to farmers because the erosion and crop loss suffered in major floods outweighs the benefits which may result from the deposit of silt on agricultural land by minor flooding. Many thousands of tons of valuable topsoil in Santa Clara County were eroded and removed during the 1955 flood. According to

Farm Bureau representatives, farmers in Santa Clara County suffered losses that cannot be completely estimated until all crops are harvested, but silting, erosion, and crop curtailment damage by the December, 1955 flood will total many millions of dollars. Unless channels are improved, the increased runoff resulting from urbanization will increase silt deposits and erosion in future floods of like magnitude and intensity. Present trends indicate that Santa Clara Valley, if given proper protection from floods, will become one of the nation's great centers for light industry which will, in turn, create employment and business activity resulting in a sound economy. If residential, commercial and industrial development of the area within Zone NC-1 can be enhanced by adequate flood control work, the increase in assessed valuation, created by the addition of structural improvements to land, will be substantial. The rate of such increase would be closely associated by direct ratio to the rate of progress in completing the proposed improvement.

CONCLUSION

All existing signs indicate that the phenomenal trend of economic and population growth in the Santa Clara Valley area will project many years into the future, with a strong possibility that it will accelerate. With the flood control situation already critical, it is obvious that the problems involved in providing for the public safety will rapidly multiply with continued growth.

Flood control problems will, in fact, increase to the point where development will be seriously curtailed, which will, in turn, set up a chain reaction of reduced payrolls in the building trade, then will follow shrinking retail sales, then more unemployment in affected commercial and industrial organizations, and so on to a state of economic paralysis.

The alternative, of course, is approval of a bond issue that will finance flood control improvements proposed in this report. Not only is a flood menace intolerable, but in this area it is unnecessary. The body of this report described plans for the control of anticipated floods in this zone, and needs only ratification by the voters to effect construction of improvements that will be a permanent investment in the economic security of the Santa Clara Valley area.

Financial obligations to be accepted by the voters will steadily decrease as bond retirement costs are spread over the ever-increasing assessed valuation effected by the constant residential, commercial and industrial growth in this area. It is forseeable that unit bond tax obligations will be cut in half within a few years by a corresponding doubling in assessed valuation.

With the information as to the economic feasibility of the proposed project made available in this report, it is possible for all civic-minded individuals and organizations strongly to advocate the passage of a financing bond issue in this zone and thus assure its continued economic stability, as well as safety of life and property of Santa Clara Valley residents.